Shaughnessy No.: 079404

Due date: 3/6/84

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To: George LaRocca
Product Manager #15
Registration Division (TS-767)

From: L.A. Richardson, Chief
Environmental Chemistry Review Section 3
Exposure Assessment Branch
Hazard Evaluation Division (TS-769c)

Attached, please find the EAB review of:

Reg./File No.: 8340-13

Chemical: Endosulfan

Type Product: I

Product Name:

Company Name: American Hoechst

Submission Purpose: response to registration standard

ZBB Code: _____ Action Code: 660

Date In: 1/6/84 EFB No.: 4146

Date Completed: _____ TAIS (Level II) 65 Days 3

Deferrals To:

_____ Ecological Effects Branch

__/__ Residue Chemistry Branch Patricia Ott Mar 2, 1987

_____ Toxicology Branch

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## Endosulfan Column Soil Leaching Study (Tab J-1)

Reference: Submitted by American Hoechst Corporation, EPA Reg. No. 8340-13, cover memo dated December 23, 1983.

Conclusions:

This study does not meet the registration requirement for leaching, for either parent or degradates, because an insufficient volume of water was used - less than one column volume and 2 1/2 times less than is required (1000 ml). Also, endosulfan has domestic outdoor, green house and aquatic food uses and an adsorption/desorption test on aquatic sediment is required for the aquatic food use (watercress).

Materials and Methods:

Three soils were used: sand, loamy sand and sandy loam which was added to 5 cm i.d. columns to a depth of 28 cm.

Loamy sand (fortified with radiolabeled endosulfan) was used for the aged study and after 30 days' incubation, portions were added to three soil columns, each containing a different soil. The columns were leached with 393 ml of water. Soil samples (5 cm sections) were extracted with acetonitrile/toluene. Both samples and eluate were analyzed by radio-TLC and scintillation counting.

Reported Results:

a-and B-endosulfan, endosulfan sulfate and endosulfan alcohol did not leach beyond 10 cm.

| | Loamy Sand (after 30 days' incubation in darkness) % of applied 14-C extracted |
|---|---|
| a-endosulfan | 47.5 |
| B-endosulfan | 29.3 |
| endosulfan sulfate | 12.0 |
| endosulfan alcohol | 4.0 |
| total | 92.8 |

Discussion:

1. There was more leaching in the aged loamy sand and sandy loam than sand.

2. No $K_d$ values were presented in this study, but an adsorption/desorption study was also submitted.

3. It appears that only one soil column for each type of soil was run.

## Endosulfan Adsorption/Desorption Study
(Tab J-2)

Reference: Hoe 002671, adsorption/desorption in the soil/water system (Tab J-2), submitted by American Hoechst Corporation. EPA Reg. No. 8340-13, cover memo dated December 23, 1983.

Conclusions:

This study partially fulfills the leaching requirement by providing information for adsorption/desorption for the parent compound, endosulfan. Endosulfan binds strongly to two sands ($K_d$ 29-72) and a sandy loam ($K_d$ = 33) containing from 0.8% to 2.58% organic carbon. Desorption was $\leq$ 3%.

This study does not completely fulfill the registration requirement for the following reasons:

1. Workers failed to provide adsorption coefficients ($K_d$) for degradates.

2. No $K_d$ values for parent and degradates were provided for an aquatic sediment, which is required for the aquatic food use (watercress).

Materials and Methods:

Four concentrations of radiolabeled endosulfan in a 0.01 M $CaCl_2$ solution were equilibrated with each of three soils: two sands and a sandy loam. After centrifugation, the water phase was analyzed by liquid scintillation counting.

Reported Results:

| | $K_d$ Soil/Water (22°C) | $K_{oc}$ Soil/Water (22°C) |
|---|---|---|
| Sand (0.8% org. C) | 29±8 | 3600±1000 |
| Sand (2.58% org. C) | 72±20 | 2800±800 |
| Sandy Loam | 33±7 | 3300±700 |

Concentration range: 0.04 umol-1.04 umol/l
Desorption: <3% $K_{des}$ 7xK)

Discussion:

1. Two of the three soils selected were sands. Sand is an acceptable soil for one soil, as well as the sandy loam, which was the third soil studied. Instead of a second sand, another soil type, such as clay or clay loam should have been chosen. However, since endosulfan adsorbs appreciably to sand, this objection is not critical for endosulfan.

2. It is not good laboratory practice to evaporate pesticide samples to dryness because losses can occur, unless oil/fat is present.

Endosulfan Terrestrial Field Dissipation Study (Tab J-3)

Reference: Submitted by American Hoechst Corporation. EPA Reg. No. 8340-13, cover memo dated December 23, 1983.

This is not new data, but a summary of four published studies. Three of the four (studies 1, 2, and 3) were reviewed as part of the registration standard. These are summarized from EAB's Task 1. The fourth study (Study 4, Rao and Murty (1980), was reviewed as a new study, since the reviewer was able to obtain the hard copy from an EAB journal.

Study 1. Study of Gorbach et al. (found in Task 1, Study 78) S. Gorbach, R. Haarring, W. Knauf and H.J. Werner. Bull. Environ. Contam. Toxicol. 6(3)193-199 (1971).

This study is an aquatic field dissipation study, not a terrestrial field dissipation study and also, this study is for a rice use in rice fields and endosulfan has no rice use, so it is inappropriate for both the terrestrial and aquatic field dissipation studies.

Study 2. Study of van Dyk and van der Linde (found in Task 1, Study 82) L.P. van Dyk and A. van der Linde. Agrochemophysica 8(2) 31-34 (1976)

This study does not satisfy the terrestrial field dissipation requirement because data was missing for some of the field samples, there was inadequate sampling, and the authors did not determine the concentration of endosulfan applied to the field sampled.

Study 3. Study of El Zorgani (found in Task 1, Study 39) G.A. Zorgani. Bull. Environ. Contam. Toxicol. 15(3), 378-382 (1976)

This study does not meet the terrestrial field dissipation study requirement because residues found immediately post-application were four times higher than the concentration of endosulfan applied to the soil. Also, samples were only analyzed weekly for seven weeks, soil characteristics were not given, soil samples were not analyzed for degradation products and only results from one of the two plots studied were included.

Study 4. Study of Rao and Murty (not in Task 1 of the registration standard)

Reference: Published study (D. Rao and A. Murty, J. Agr. Food Chem. 1980, #28, vol. 6 1099-11101) submitted by American Hoechst Corporation, EPA Reg. No. 8340-13, cover memo dated December 23, 1983.

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Conclusions:

It is impossible to assess the validity of this study because critical information is missing, such as size of plots, sampling depth, temperature, controls, pre-application sampling, type of equipment used, and how the pesticide was applied. Also, normal field practice for cotton is 2-3 applications at 5-7 day intervals at 0.75-1.5 lb/A and these workers only applied a maximum of 0.8 lb/A once. This study was conducted in India. The registrant only provided a brief summary of this published study. The reviewer obtained the hard copy but many essential details are missing.

Materials and Methods:

Since endosulfan is not registered for rice, the paddy field (flooded) application is not discussed.

Three test plots were sprayed with a 35% EC formulation at 0.1, 0.2, and 0.8 lb/A on a loamy clay soil. Cotton was growing in two of the plots and eggplant was in the third, sampling depth unknown. Core samples (7"deep) were taken at day 100 in one plot only.

Samples were Soxhlet extracted, cleaned up with a charcoal column and analyzed by TLC and colorimetry. The limit of detection was 0.05 ppm and recovery was 87%.

Reported Results:

The half-life for the three application levels appears to be $\leq$10 days. At day 100, endosulfan and metabolites did not leach beyond the 4 inch depth, sampled to 7 inches.

Discussion:

1. Study was done at one-half the highest recommended rate and only with one application.

2. Sampling depth not stated.

3. Method of application not given, including equipment used to apply.

4. Temperature not given.

5. No data for formation and decline of metabolites was given.

6. There was no mention of control samples.